Cornell University

Announcements

Graduate School of Nutrition

1971-72

Supplement to Volume 63, Number 5, April 22, 1971

CORNELL UNIVERSITY ANNOUNCEMENTS

Graduate School of Nutrition

When referring to the pages listed below, please make note of the following changes.

p. 14 Graduate Record Examinations (GRE) Aptitude Tests (verbal and quantitative) are required.

p. 14 Foreign applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL) and receive a minimum score of 550.

p. 15 If students demonstrate suitable training and experience in quantitative methods, a course in quantitative chemistry is unnecessary.

p. 20 Biological Sciences 633-638 Advanced Biochemistry Series can only be used for Advanced Nutrition credit when the topic pertains to nutrition and the Admissions and Counseling Committee has approved.

p. 23 The registration fee has been changed from $35 to $50.

p. 24 Tuition for the academic year 1971-72 was $200 per term. The General Fee was $350 per term. Students should refer to the *Announcement of General Information 1972-73* for a current schedule of tuition and fees.

p. 25 The Cornell Graduate Fellowship Board has an application deadline of February 1. This date does not apply to the Graduate School of Nutrition Assistantships and Traineeships.

p. 28 Special Topics in Nutrition (GSN 660) must be approved for Advanced Nutrition credit by the Admissions and Counseling Committee.

Cornell Academic Calendar

	1972-73
Registration, new students	Th, Aug. 31
Registration, continuing and rejoining students	F, Sept. 1
Fall term instruction begins, 7:30 a.m.	M, Sept. 4
Thanksgiving recess:	
Instruction suspended, 1:10 p.m.	W, Nov. 22
Instruction resumed 7:30 a.m.	M, Nov. 27
Fall term instruction ends, 1:10 p.m.	S, Dec. 9
Independent study period begins, 2:00 p.m.	S, Dec. 9
Final examinations begin	Th, Dec. 14
Final examinations end	F, Dec. 22
Christmas recess and intersession	
Registration, new and rejoining students	Th, Jan. 18
Registration, continuing students	F, Jan. 19
Spring term instruction begins, 7:30 a.m.	M, Jan. 22
Spring recess:	
Instruction suspended, 1:10 p.m.	S, Mar. 17
Instruction resumed, 7:30 a.m.	M, Mar. 26
Spring term instruction ends, 1:10 p.m.	S, May 5
Independent study period begins, 2:00 p.m.	S, May 5
Final examinations begin	M, May 14
Final examinations end	T, May 22
Commencement Day	F, May 25

The dates shown in the Academic Calendar are subject to change at any time by official action of Cornell University.

Cornell University

Graduate School of Nutrition

1971-72

The Graduate School of Nutrition, a unit of Cornell University, is supported in part by state appropriations through the State University of New York.

CORNELL UNIVERSITY ANNOUNCEMENTS

Volume 63 of the Cornell University Announcements consists of twenty-three catalogs, of which this is number 1, dated January 29, 1971. Publication dates: twenty-three times a year (four times in August and October; three times in March and November; twice in July and September; once in January, April, May, June, and December). Publisher: Cornell University, Sheldon Court, 420 College Avenue, Ithaca, New York 14850. Second-class postage paid at Ithaca, New York.

Contents

The courses and curricula described in this *Announcement,* and the teaching personnel listed herein, are subject to change at any time by official action of Cornell University.

Cornell Academic Calendar

	1971–72*
Registration, new and rejoining students	Th, Sept. 2
Registration, continuing students	F, Sept. 3
Fall term instruction begins, 7:30 a.m.	M, Sept. 6
Thanksgiving recess:	
Instruction suspended, 1:10 p.m.	W, Nov. 24
Instruction resumed, 7:30 a.m.	M, Nov. 29
Fall term instruction ends, 1:10 p.m.	S, Dec. 11
Independent study period begins, 2:00 p.m.	S, Dec. 11
Final examinations begin	Th, Dec. 16
Final examinations end	Th, Dec. 23
Christmas recess and intersession	
Registration, new and rejoining students	Th, Jan. 20
Registration, continuing students	F, Jan. 21
Spring term instruction begins, 7:30 a.m.	M, Jan. 24
Spring recess:	
Instruction suspended, 1:10 p.m.	S, Mar. 18
Instruction resumed, 7:30 a.m.	M, Mar. 27
Spring term instruction ends, 1:10 p.m.	S, May 6
Independent study period begins, 2:00 p.m.	S, May 6
Final examinations begin	M, May 15
Final examinations end	M, May 22
Commencement Day	F, May 26

* The dates shown in the Academic Calendar are subject to change at any time by official action of Cornell University.

Uris Library, with its clock tower, and Olin research library (right) are two of the several large libraries on the Cornell University campus.

Graduate School of Nutrition

University Administration

Dale R. Corson, President of the University
Robert A. Plane, University Provost
Mark Barlow, Jr., Vice President for Student Affairs
Lisle C. Carter, Jr., Vice President for Social and Environmental Studies
W. Donald Cooke, Vice President for Research
Lewis H. Durland, University Treasurer
W. Keith Kennedy, Vice Provost
Samuel A. Lawrence, Vice President for Administration
E. Hugh Luckey, Vice President for Medical Affairs
Thomas W. Mackesey, Vice President for Planning
Paul L. McKeegan, Director of the Budget
Robert D. Miller, Dean of the University Faculty
Steven Muller, Vice President for Public Affairs
Arthur H. Peterson, University Controller
Neal R. Stamp, Secretary of the Corporation and University Counsel

Administration of the Graduate School of Nutrition

Dale R. Corson, President of the University
Robert A. Plane, University Provost
Richard H. Barnes, Dean of the School
Charlotte M. Young, Secretary of the School

Faculty

More than fifty professors are on the faculty of the Graduate School of Nutrition. Most hold joint appointments in the School and have their main affiliation in other colleges at the University. The core faculty includes those professors whose primary appointments are in the Graduate School of Nutrition.

Core Faculty

Graduate Fields with which these professors are affiliated are in italics.

Barnes, Richard H., Ph.D., Professor, *Nutrition*
Call, David L., Ph.D., H. E. Babcock Professor of Food Economics, *Agricultural Economics*
Gaylor, James L., Ph.D., Professor, *Biochemistry,* and *Nutrition*
Latham, Michael C., M.D., Professor, *Nutrition*
Levitsky, David A., Ph.D., Assistant Professor, *Psychology*
Lutwak, Leo, Ph.D., M.D., James Jamison Professor of Clinical Nutrition, *Human Nutrition and Food, Nutrition,* and *Physiology*
Maynard, Leonard A., Ph.D., Professor Emeritus
McCormick, Donald B., Ph.D., Professor, *Biochemistry,* and *Nutrition*
Roe, Daphne A., M.D., Associate Professor, *Human Nutrition and Food,* and *Nutrition*

Simko, Vladimir, M.D., Clinical Assistant Professor
Wright, Lemuel D., Ph.D., Professor, *Biochemistry,* and *Nutrition*
Young, Charlotte M., Ph.D., Professor, *Human Nutrition and Food,* and *Nutrition*
Zilversmit, Donald B., Ph.D., Professor, *Physiology,* and *Biochemistry*

Joint Faculty

The titles and the departments (or sections) of primary affiliation of faculty members are indicated.

Apgar, B. Jean, Ph.D., Research Chemist, U.S. Plant, Soil, and Nutrition Laboratory
Armbruster, Gertrude D., Ph.D., Associate Professor, Human Nutrition and Food
Austic, Richard E., Ph.D., Assistant Professor, Poultry Science
Baker, Robert C., Ph.D., Professor, Poultry Science
Bensadoun, André A., Ph.D., Associate Professor, Poultry Science
Buck, Paul A., Ph.D., Associate Professor, Food Science and Technology
Comar, Cyril L., Ph.D., Professor, Physical Biology
Daniel, Louise J., Ph.D., Professor, Biochemistry
Devine, Marjorie M., Assistant Professor, Human Nutrition and Food
Finn, Robert K., Ph.D., Professor, Chemical Engineering
Hackler, L. Ross, Ph.D., Associate Professor, Food Science and Technology, Geneva
Hartman, John D., Ph.D., Professor, Vegetable Crops
Hester, E. Elizabeth, Ph.D., Professor, Human Nutrition and Food
Hintz, Harold F., Ph.D., Assistant Professor, Animal Science
Hogue, Douglas E., Ph.D., Associate Professor, Animal Science
Isenberg, F. M. R., Ph.D., Professor, Vegetable Crops
Krook, Lennart, D.V.M., Ph.D., Professor, Veterinary Pathology
Lengemann, Frederick W., Ph.D., Professor, Physical Biology
Loosli, John K., Ph.D., Professor, Animal Science
Mattick, Leonard R., Ph.D., Associate Professor, Food Science and Technology, Geneva
Merrill, William G., Ph.D., Associate Professor, Animal Science
Mondy, Nell, Ph.D., Associate Professor, Human Nutrition and Food
Morrison, Mary A., Ph.D., Professor, Human Nutrition and Food
Moyer, James C., Ph.D., Professor, Food Science and Technology, Geneva
Nelson, Walter L., Ph.D., Professor, Biochemistry
Nesheim, Malden C., Ph.D., Professor, Poultry Science
Newman, Katherine J., Ph.D., Associate Professor, Human Nutrition and Food
Pond, Wilson G., Ph.D., Associate Professor, Animal Science
Reid, John Thomas, Ph.D., Professor, Animal Science
Rivers, Jerry Margaret, Ph.D., Associate Professor, Human Nutrition and Food
Robinson, Willard B., Ph.D., Professor, Food Science and Technology, Geneva
Schwartz, Ruth, Ph.D., Associate Professor, Human Nutrition and Food
Scott, Milton L., Ph.D., Professor, Poultry Science
Seeley, Harry W., Jr., Ph.D., Professor, Microbiology
Shallenberger, Robert S., Ph.D., Professor, Food Science and Technology, Geneva
Smith, Sedgwick E., Ph.D., Professor, Animal Science
Smock, Robert M., Ph.D., Professor, Pomology
Snook, Jean T., Ph.D., Associate Professor, Human Nutrition and Food
Steinkraus, Keith H., Ph.D., Professor, Food Science and Technology, Geneva
Turk, Kenneth L., Ph.D., Professor, Animal Science
Van Buren, Jerome P., Ph.D., Professor, Food Science and Technology, Geneva
Van Campen, Darrell R., Ph.D., Research Biochemist, U.S. Plant, Soil, and Nutrition Laboratory
Van Soest, Peter J., Ph.D., Associate Professor, Animal Science
Visek, Willard J., Ph.D., M.D., Professor, Animal Science
Warner, Richard G., Ph.D., Professor, Animal Science
Wasserman, Robert H., Ph.D., Professor, Physical Biology
Wellington, George H., Ph.D., Professor, Animal Science
Williams, Harold H., Ph.D., Professor, Biochemistry
Winick, Myron J., M.D., Associate Professor, Pediatrics, Cornell Medical College, New York City
Young, Robert J., Ph.D., Professor, Poultry Science


SAVAGE HALL
NUTRITION

Cornell University

Graduate School of Nutrition

The Graduate School of Nutrition was founded in 1941 to provide graduate training and research opportunities in nutrition at Cornell. Although graduate programs in nutrition are now available in other departments of the University, the Graduate School of Nutrition offers its own broad academic program designed not only as a final preparation for those students who, after graduation, wish to work in the area of nutritional science, but also as an excellent background for students who are deciding upon a specific area for doctoral training in nutrition or a related science. Special instruction is available to students whose previous academic training has not been in the area of nutrition.

In the past, the study of nutrition dealt with the relationships between the biological sciences and the intact organism, in the healthy or diseased state. Today the concept of nutrition embraces many more disciplines including the behavioral sciences, food technology, economics, and education. Appreciating the fact that the science of nutrition cannot exist separately from fundamental biochemistry, the research and training programs of the Graduate School of Nutrition have for some time been aligned with heavy emphasis on biochemistry in areas ranging from the study of enzymological phenomena at the subcellular level to the direct application of biochemical principles in animals and man.

In keeping with the growing recognition of the interdependence of the nutritional and social sciences, the research programs at the School also include such studies as the effect of early nutrition on behavioral development and investigations of the complex social, cultural, and economic factors which influence nutritional practices and contribute to the vast problem of malnutrition during early life.

Nutrition Programs at Cornell

In addition to the Graduate School of Nutrition which offers the professional degree program described in this *Announcement* leading to the degree of Master of Nutritional Science (M.N.S.), there are two other units of the University which offer graduate programs in nutrition.

avage Hall is the home of the Graduate School of Nutrition.

First, the Graduate Field of Nutrition includes all Cornell faculty members who are qualified to direct graduate students toward the M.S. or Ph.D. degree in the many biological subdivisions of nutrition. Second, the Graduate Field of Human Nutrition and Food is staffed mainly by faculty from the New York State College of Human Ecology and offers another program which also leads to the M.S. or Ph.D. degree. The professional degree program differs from the M.S. degree programs primarily in that it has a planned curriculum, and therefore more attention is given to breadth of background in a variety of academic subjects than is usually the case in the curriculum leading to the M.S. degree. However, many students who have obtained the excellent training of the M.N.S. degree continue for a Ph.D. degree. In addition to a core faculty of the Graduate School of Nutrition, the faculty of a number of departments and divisions of the University are drawn upon to provide counseling and instruction in the School's program.

For more information about the three different nutrition programs, write to the Editor of Publications, Savage Hall, for the brochure entitled *Graduate Study in Nutrition at Cornell.*

The Faculty

A faculty of more than fifty professors serves the Graduate School of Nutrition to make possible the School's extensive program. Most of the faculty members hold joint appointments in the Graduate School of Nutrition but have their primary affiliation in other colleges at Cornell. The core faculty includes twelve professors whose primary appointments are in the School. Among the core faculty members are biochemists working in areas from subcellular enzymology to the more direct application of biochemistry to the nutritional status of the intact organism; physicians conducting continuous metabolic studies of a variety of clinical conditions; experimental nutritionists and an experimental psychologist using animals to replicate some of the more serious problems of malnutrition in man; and public health nutritionists and physicians training students for careers in public health and community nutrition, either domestic or international, and conducting research in the applied problems of nutrition.

The complete faculty of the School also includes animal nutritionists, food economists, food scientists, and specialists in other areas related to agriculture and home economics.

Core faculty offices and laboratories are located in Savage Hall and in its Clinical Nutrition Unit in Cornell's Sage Infirmary.

Curriculum

The Graduate School of Nutrition offers a professional degree, Master of Nutritional Science (M.N.S.). Considering the many disciplines associated with nutrition, this Master's degree program is designed to be academically strong and professionally useful. The caliber of positions held by graduates reflects the quality of training received. The student obtains a firm founda-

tion in the sciences basic to his chosen area of specialization, as well as practical preparation, through carefully selected courses and a special research problem, for work in his professional career. Each student selects a faculty adviser in whose area of specialization his own interests lie. An adviser may be selected from among those on the entire faculty, however, members of the core faculty serve as advisers more frequently. The adviser plans the curriculum and directs the student's special research problem, which includes a prepared report of thesis quality. The curriculum is designed to meet the student's particular needs according to his educational background, area of graduate study, and professional goals after graduation.

Students completing the M.N.S. degree also have excellent training for more advanced study. Many continue for a Ph.D. degree in such areas as biochemistry, physiology, and nutrition (animal or human). Numerous students have found the M.N.S. degree program particularly helpful in the selection of an area of graduate study leading to the Ph.D. degree and have used the program as a stepping-stone when their future ambitions were not yet established.

Master of Nutritional Science

One of the strengths of the School, not found in many other institutions, is that there are a number of specializations within the M.N.S. degree program. Among these are:

nutritional biochemistry
experimental animal nutrition
clinical nutrition
public health nutrition
international nutrition

The basic training for the degree emphasizes the physical and biological sciences and the basic principles of nutrition. Through an appropriate curriculum planned by his adviser, the student learns to apply these basic principles in the particular specialization in which he wishes to become proficient. Experience in a laboratory or in field work usually becomes the basis of the special research problem report. Facilities for research include biochemical, microbiological, and physiological laboratories, experimental animal quarters, a diet table for experimental work in human studies, and a metabolic unit in Cornell's Sage Infirmary for the study of nutrition in relation to disease.

Since two of the specializations, public health nutrition and international nutrition, involve special arrangements for field experience rather than laboratory training, they will be described in more detail.

PUBLIC HEALTH NUTRITION. Special opportunities are provided for students of appropriate background who want to work as community nutritionists with health and welfare agencies. The curriculum in this specialization includes certain phases of the social sciences, education, clinical and public health nutrition, and appropriate information service techniques. Students accepted for training in this area gain further insight into public health nutrition by spending a two-month summer period in "in-service" nutritional training as applied to the community and to public health under the super-

Dean Barnes discusses a research problem with students.

vision of a qualified public health nutritionist. Assistance will be given in making the necessary contacts to obtain a training program directed by a qualified nutritionist. Students must be prepared to defray living costs. These field assignments may form the basis for a portion of the required report on an individual's research problem.

INTERNATIONAL NUTRITION. The School offers a program in international nutrition to meet the need for professionally trained men and women to work for government and international agencies in those developing countries where malnutrition and undernutrition exist. The program includes courses in the sciences basic to nutrition that are extensive enough to equip students for a variety of careers in nutrition. Emphasis in electives is then placed on specialized study in problems and programs in international nutrition and related areas such as agriculture, public health, extension teaching, sociology, anthropology, demography, economics, and nutrition education. It is usually possible for students to obtain supervised field experience in a nutrition program in a developing country for two or three months. Several traineeships and assistantships are available to qualified students. For further details, request the leaflet *Program in International Nutrition* from the Graduate School of Nutrition.

The Ph.D. Degree at Cornell

At Cornell, all graduate programs for the Ph.D. degree are under the jurisdiction of the Graduate School of the University and are directed by Fields.

Faculty members of the Graduate School of Nutrition are members of certain Fields of the Graduate School, such as Biochemistry, Nutrition, Human Nutrition and Food, Physiology, and Agricultural Economics. The academic background of a professor determines the Field in which he is appointed.

Graduate training and research are major responsibilities of the core faculty of the Graduate School of Nutrition. It is through this faculty and the research they conduct that training for the Ph.D. degree is carried out in the School. More than half the students completing the M.N.S. degree at the School continue toward a Ph.D. degree with the advantage of doing so without disturbing the continuity of their studies. Often a Ph.D. candidate continues to work with his original adviser because the student has a research interest developed through close association with his professor during the Master's degree program.

Postdoctoral Studies

As in all scholarly pursuits, training in research does not end with a doctoral degree. It is becoming more and more common for students receiving the Ph.D. degree to continue their training in research for one or two postdoctoral years. Mature scientists also frequently seek an opportunity to revitalize their research programs, using sabbatical or other types of leaves from their home institutions to come here for additional research experience. Thus there are always some of these scientists working at the postdoctoral level at the Graduate School of Nutrition; not only do they gain from the experience, but their presence here is stimulating to the staff and students of the School.

Special Students

When staff and facilities are available, some applicants who do not intend to work toward an advanced degree at Cornell may be admitted. Normally such students wish to achieve particular objectives by taking courses and special training in graduate nutrition programs. In order to be admitted to a nondegree program, a student should have a Bachelor's degree although, with appropriate justification, this requirement may be waived. These special students are not subject to the standard course requirements for admission to the Graduate School of Nutrition, nor to requirements for course work to be completed for graduate degrees. Registration in such a program is restricted to two semesters.

Summer Session Study

A student registered in the Graduate School of Nutrition may receive credit for courses completed at the University during the summer if his program is approved in advance by his faculty adviser. To receive this credit he must also be registered in the University Summer Session.

The student may earn residence credit by registering for a minimum of four or a maximum of twelve weeks for summer research on his individual problem under the personal direction of a member of the faculty of the School. The student thus uses the summer period to meet, in whole or in

part, the requirements of six semester hours for the Special Problem, Graduate School of Nutrition 710. See p. 21.

To receive credit for summer courses and/or research, students must complete official registration using forms provided by the Office of the Registrar and administered by the Office of the Summer Session.

Admission Requirements

It is the policy of Cornell University actively to support the American ideal of equality of opportunity for all, and no student shall be denied admission or be otherwise discriminated against because of race, color, creed, religion, or national origin.

To be admitted to a Master of Nutritional Science degree program in the Graduate School of Nutrition, an applicant must hold a baccalaureate degree from a college or university of recognized standing, or have completed work equivalent to that required for such a degree at Cornell. (Specific academic requirements for admission are outlined on p. 15.) He must show promise of ability to pursue advanced study and research satisfactorily, as judged by his previous record. To enter graduate study the applicant must also have adequate preparation and a definite interest in his chosen field of specialization, although his previous academic training need not necessarily be in the area of nutrition.

All applicants for admission and fellowship consideration are urged to take the Graduate Record Examinations (GRE) Aptitude Tests (verbal and quantitative) of the Educational Testing Service, and to have the scores sent to the Cornell Graduate School as part of their application materials. Information about the times and places of test administrations may be obtained directly from the Educational Testing Service, Princeton, New Jersey 08540.

English Proficiency Requirement

Foreign applicants whose native language is not English and who have not received their secondary-school or university education in the English language must take the Test of English as a Foreign Language by arrangement with Educational Testing Service, Princeton, New Jersey 08540, U.S.A., or the Michigan English Language Test by arrangement with the English Language Institute, University of Michigan, Ann Arbor, Michigan 48104, U.S.A. The test scores must be reported directly by the testing organization to the Graduate School as part of the essential application information, and no final action on applications will be taken until the scores have been received. Both testing programs are available throughout the world. Information on times and places for administration of the tests may be obtained directly from the addresses given above. Since these tests are diagnostic, admission to those applicants whose scores indicate unsatisfactory command of English

may be denied or may be made contingent upon evidence of improved command of English.

If English has been the medium of instruction in the secondary school or university, a statement to this effect signed by a responsible officer of a United States embassy or consulate or by an appropriate official of the educational institution involved should be sent to the Graduate School.

Academic Requirements

To qualify for admission, an applicant must have completed, with an above average record, courses in the following groups of subjects with the approximate number of semester hours as stated. A weekly one-hour lecture per fifteen-week term is approximately equal to one semester hour credit. An applicant who cannot meet in full the specific course requirements may be admitted if the faculty of the School so recommends, with the understanding that the deficiencies must be made up before graduation without credit toward the degree. Academic requirements for admission depend on whether the student wants to concentrate on the biological aspects of nutrition (e.g. nutritional biochemistry, experimental animal nutrition, or clinical nutrition) or on the social science aspects of nutrition (e.g. international nutrition or public health nutrition).

For Concentration on Biological Aspects of Nutrition

Courses in quantitative or organic-chemistry, or elementary courses in physics or physiology, taken following admission to complete entrance requirements, cannot be counted toward graduation.

PHYSICAL SCIENCES. A total of twenty semester hours are required divided among chemistry, physics, and mathematics. Courses in quantitative chemistry and organic chemistry are prerequisites to courses required for graduation. If they are not offered for entrance, they must be taken following admission. Students who enter without college training in physics are required to take an elementary course in that subject before graduation.

BIOLOGICAL SCIENCES. A total of twelve hours are required in such courses as biology, botany, zoology, microbiology, and physiology. Up to three credit hours in animal or human nutrition may be counted.

SOCIAL STUDIES. A total of nine hours in such subjects as economics, government, education, psychology, anthropology, and history must be offered for entrance.

OTHER COURSES. The applicant's record must show evidence that he has satisfactorily completed other courses prerequisite to those required by the candidate for a degree.

RECOMMENDED COURSES. Students who have completed the above entrance requirements prior to receiving a baccalaureate degree are urged to take as many as possible of the following subjects in order to be better

prepared for some of the more advanced courses required for graduation: physical chemistry, calculus, courses related to physiology (e.g. zoology, comparative anatomy, embryology), and/or two terms of organic chemistry.

For Concentration on Social Science Aspects of Nutrition

Courses in quantitative or organic chemistry, or elementary courses in physics or physiology, taken following admission to complete entrance requirements, cannot be counted toward graduation.

PHYSICAL SCIENCES. A total of sixteen semester hours divided among chemistry, physics and mathematics are required. A course in organic chemistry is prerequisite to courses required for graduation. If it is not offered for entrance, it must be taken following admission. Students who enter without college training in physics are required to take an elementary course in that subject before graduation.

BIOLOGICAL SCIENCES. A total of nine hours in such courses as biology, botany, zoology, microbiology, and physiology are required. Up to three credit hours in animal or human nutrition may be counted.

SOCIAL STUDIES. A total of twelve hours in such subjects as economics, government, education, psychology, anthropology, and history must be offered for entrance.

HUMANITIES. A total of four hours in such subjects as English, other languages, classics, and arts are required.

OTHER COURSES. The applicant's record must show evidence that he has satisfactorily completed other courses prerequisite to those required by a candidate for a degree.

RECOMMENDED COURSES. See p. 15.

University Health Requirements

The following health requirements for entering graduate students have been adopted by the Cornell Board of Trustees. Failure to fulfill these requirements will result in loss of the privilege of registering the following semester. The responsibility for fulfilling these requirements rests with the student.

IMMUNIZATION. A satisfactory certificate of immunization against smallpox, on the form supplied by the University, must be submitted before registration. It will be accepted as satisfactory only if it certifies that within the last three years a successful vaccination has been performed. If this requirement cannot be fulfilled by the student's home physician, opportunity for immunization will be offered by the Cornell medical staff during the student's first semester, with the cost to be borne by the student. If a student has been absent from the University for more than three years, immunity will be considered to have lapsed, and a certificate of revaccination must be submitted.

It is strongly recommended by the University Health Services that all graduate students have immunization against tetanus before entering the University. All graduate students may, however, obtain initial and all booster tetanus toxoid immunizations at the Gannett Medical Clinic for a nominal charge.

HEALTH HISTORY. Graduate students, when accepted, must submit health histories on forms supplied by the University. These should be returned promptly to the Gannett Medical Clinic. A University physician will review the material before it becomes part of the student's permanent health record. All information given is confidential. After arrival at Cornell, if the medical history indicates a need, a student will be given an appointment to consult a physician at the Clinic. When a student has been away from the University for more than a year, he must, upon reentrance, submit an interim health history on a University form.

X RAY. Every student is required to have a chest x ray. Opportunity is given to satisfy this requirement during the student's first week on campus. The cost of the x-ray examination is included in the General Fee. When a student who has been away from the University for more than a year wishes to reenter, he must, at his own expense, again fulfill the chest x-ray requirement.

Applications and Registration

Applicants for admission should address their inquiries to the Office of the Graduate School, Sage Graduate Center, Cornell University, Ithaca, New York 14850. The form the applicant will receive is one which is used in all areas of graduate study and does not apply in all of its details to Graduate School of Nutrition applicants. In completing the form, applicants must indicate an interest in *nutritional science for the M.N.S. degree in the Graduate School of Nutrition.* It is not necessary to indicate a minor area of study. No application will be acted upon until all credentials enumerated in the application form have been filed.

All students admitted to the Graduate School of Nutrition must register through the Graduate School office, Sage Graduate Center, at the beginning of each term or session.

Graduation Requirements

Academic Requirements

The degree of Master of Nutritional Science (M.N.S.) is awarded after satisfactory completion of a special research problem and courses considered basic to an understanding of nutritional science.

For graduation a student must have completed the necessary residence requirements (p. 23) and have obtained a cumulative grade average of at least a B– in a minimum of thirty-two semester hours of specified and approved courses. A weekly one-hour lecture per fifteen-week term is approximately equal to one semester hour credit. An additional six semester hours must be completed in a special research problem. The student must prepare a written report on this approved special research problem and must pass a final oral examination on the report and related course work.

Summary of Academic Requirements for Graduation

Courses	*Semester Hours*
Biochemistry	4
Principles of nutrition	3
Laboratory work in nutrition	3
Advanced physiology	3
Food economics	3
Statistics	3
Seminar	1
Advanced courses in nutrition	3
International or public health nutrition	3
Additional courses*	6
Special problem	6
	38

* To fill this requirement students concentrating on the biological aspects of nutrition will be required to do a laboratory course in biochemistry (three semester hours) and additional advanced physiology (three semester hours). Students concentrating on the social science aspects of nutrition will take approved graduate courses in the social sciences to fill this requirement.

To round out the professional training in nutritional science, the student's adviser and the faculty of the Graduate School of Nutrition may require him to take certain courses deemed appropriate to his area of interest. In the event that certain required courses have been satisfactorily completed by the student prior to his entrance to the School, substitutions will be made with the approval of his adviser.

Faculty advising students for the M.N.S. degree include Professors B. Jean Apgar, R. E. Austic, R. H. Barnes, A. Bensadoun, D. L. Call, C. L. Comar, Louise J. Daniel, Marjorie M. Devine, J. L. Gaylor, L. R. Hackler, H. F. Hintz, D. E. Hogue, L. Krook, M. C. Latham, F. W. Lengemann, D. A. Levitsky, J. K. Loosli, L. Lutwak, D. B. McCormick, W. G. Merrill, Mary A. Morrison, W. L. Nelson, M. C. Nesheim, Katherine J. Newman, W. G. Pond, J. Thomas Reid,

The Seminar Room in Savage Hall is used as a classroom, a meeting area, and a student lounge, as well as a seminar room.

Jerry M. Rivers, Daphne A. Roe, Ruth Schwartz, M. L. Scott, V. Simko, S. E. Smith, Jean T. Snook, K. L. Turk, D. Van Campen, P. J. Van Soest, W. J. Visek, R. G. Warner, R. H. Wasserman, H. H. Williams, M. J. Winick, L. D. Wright, Charlotte M. Young, R. J. Young and D. B. Zilversmit.

The minimum curriculum to be completed, including the number of semester hours required and courses generally taken to fulfill the requirement, depends on whether the student wishes to concentrate on the biological aspects of nutrition (e.g. nutritional biochemistry, experimental animal nutrition, or clinical nutrition) or on the social science aspects of nutrition (e.g. international nutrition or public health nutrition).

(A) Concentration on the Biological Aspects of Nutrition. Below is the minimum curriculum to be completed. Each category includes semester hours required and courses generally taken to fill the requirement. These are minimum requirements and are normally supplemented with additional courses.

BIOCHEMISTRY. Seven semester hours. Students generally take Biological Sciences 431 and 432 or 531 and 532. Other courses approved to fill this requirement are listed in the Biochemistry section of the Description of Courses (p. 30).

PRINCIPLES OF NUTRITION. Three semester hours. One of the following courses is generally taken: Human Nutrition and Food 332 (p. 29), Animal Science 410 (p. 30), or Graduate School of Nutrition 620 (p. 28).

LABORATORY WORK IN NUTRITION. Three semester hours. Students generally take Animal Science 511 (p. 30) or Human Nutrition and Food 524 (p. 30).

ADVANCED PHYSIOLOGY. Six semester hours. Students generally take Biological Sciences 414 (p. 33).

FOOD ECONOMICS. Three semester hours. Students generally take Graduate School of Nutrition 590 (p. 36).

INTERNATIONAL NUTRITION OR PUBLIC HEALTH NUTRITION. Three semester hours. Students generally take Graduate School of Nutrition 580 or 650 (p. 29).

ADVANCED COURSES IN NUTRITION. Three semester hours. Courses approved for this credit are listed below in the order found in the Description of Courses (p. 28–40).

Courses		*Semester Hours*
Human Nutrition and Food 501	Proteins and Amino Acids	2
Poultry Science 502	Lipids and Carbohydrates	2
Animal Science 503	Nutritional Energetics	2
Poultry Science 504	Minerals and Essential Inorganic Elements	2
Veterinary Pathology 931	Pathology of Nutritional Diseases	3
Graduate School of Nutrition* 580	International Nutrition Problems, Policy, and Programs	3
Graduate School of Nutrition* 650	Clinical and Public Health Nutrition	3
Human Nutrition and Food† 332	Principles of Human Nutrition	3
Human Nutrition and Food 441	Nutrition and Disease	3
Human Nutrition and Food 512	Nutrition and Growth	2
Human Nutrition and Food 514	Readings in Nutrition	3
Biological Sciences 530	Biochemistry of the Vitamins	2
Biological Sciences 633–638	Advanced Biochemistry Series	1 to 6

* Approved for credit if not taken previously to fulfill International Nutrition or Public Health Nutrition requirement.
† Approved for credit if not taken previously to fulfill Principles of Nutrition requirement.

SEMINAR. One semester hour. Students generally take Graduate School of Nutrition 700 (p. 39).

SPECIAL PROBLEM. Six semester hours. Graduate School of Nutrition 710 (see p. 21 for details).

STATISTICS. Three semester hours. One of the following courses is usually taken: Statistics and Biometry 510 or 511, or Industrial and Labor Relations 510 (p. 33).

(B) Concentration on the Social Science Aspects of Nutrition

BIOCHEMISTRY. Four semester hours. Students generally take Biological Science 431. Other courses approved to fill this requirement are listed in the Biochemistry section of the Description of Courses (p. 30).

PRINCIPLES OF NUTRITION. Three semester hours. One of the following courses is generally taken: Human Nutrition and Food 332 (p. 29), Animal Science 410 (p. 30), or Graduate School of Nutrition 620 (p. 28).

LABORATORY WORK IN NUTRITION. Three semester hours. Students generally take Animal Science 511 (p. 30) or Human Nutrition and Food 524 (p. 30).

ADVANCED PHYSIOLOGY. Three semester hours. Students generally take Graduate School of Nutrition 570 (p. 32).

FOOD ECONOMICS. Three semester hours. Students generally take Graduate School of Nutrition 590 (p. 36).

STATISTICS. Three semester hours. One of the following courses is usually taken: Statistics and Biometry 510 or 511, or Industrial and Labor Relations 510 (p. 34).

SEMINAR. One semester hour. Students generally take Graduate School of Nutrition 700 (p. 39).

SPECIAL PROBLEM. Six semester hours. Graduate School of Nutrition 710. (See p. 21 for details.)

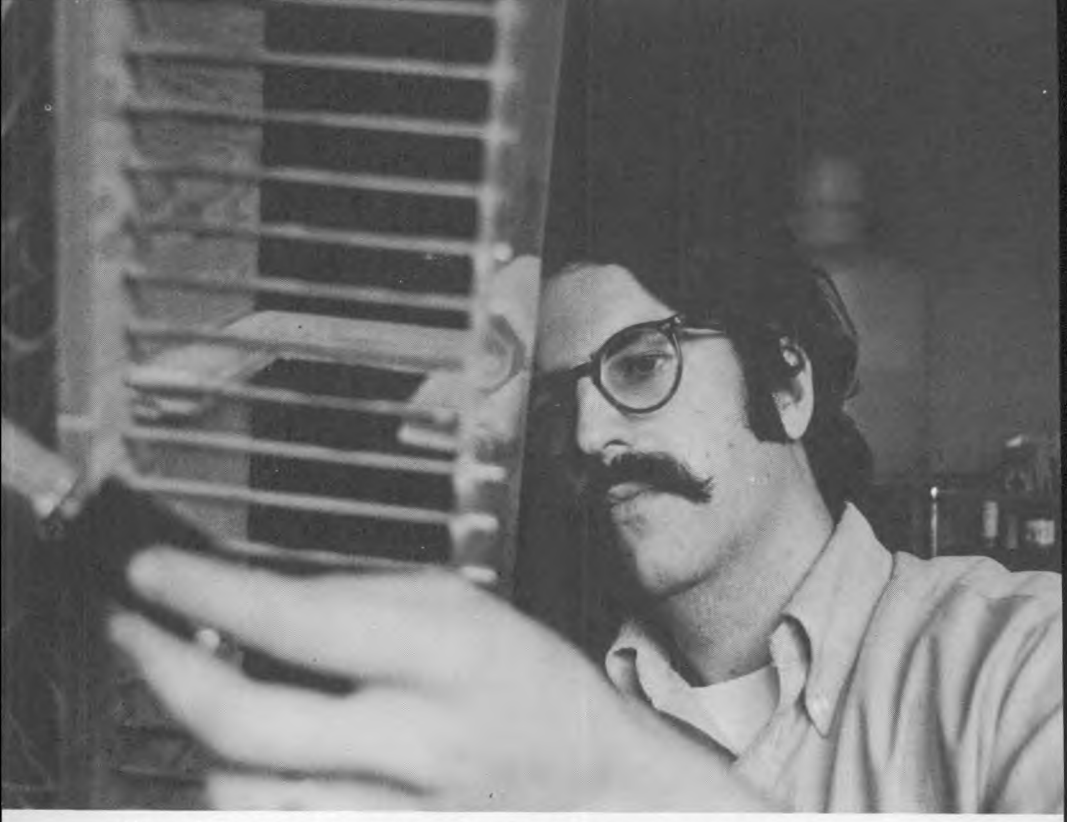
ADVANCED COURSES IN NUTRITION. Three semester hours. Courses approved for this credit are the same as those approved for students concentrating on the biological aspects of nutrition (see p. 20).

INTERNATIONAL NUTRITION OR PUBLIC HEALTH NUTRITION. Three semester hours. Students generally take Graduate School of Nutrition 580 or 650 (p. 29).

SOCIAL SCIENCES. Six semester hours. Only graduate courses are approved to fill this requirement. Three semester hours are normally in demography (Sociology 530, 531, or 535), and three semester hours in some other area of social studies (Developmental Sociology 411, 515, 516, or 528; Sociology 541; Anthropology 423, 432, 434, 436, or 441; Agricultural Economics 441, 443, 446, 450, 464, 642, 665, or 668; Education 524, 525, 626, or 627; Economics 561 or 565).

Special Research Problem—Report and Examination

The research involved in the special problem report, which should be of thesis quality, may be directed by any joint faculty member of the student's choice who is willing to supervise it. However, members of the core faculty serve as



Many of the large laboratories in Savage Hall are used for student research towards the Special Problem Report required for graduation.

advisers most frequently. The research problem is normally assigned by the student's faculty adviser.

A written report of the special research problem and a final oral examination covering both research report and course work are required. The examination is arranged at a time suitable to the examining committee which is comprised of the student's adviser plus at least one other member of the faculty to be designated by the faculty of the Graduate School of Nutrition or its delegated agent. A legible copy of the report as approved by the student's adviser must be submitted to the examining committee at least one week prior to the final examination.

The final copy of the written report, including any changes recommended by the examining committee, must be submitted to the Office of the Dean of the Graduate School of Nutrition as soon as possible after the final examination. This report should be typed, double spaced, on 8½-by-11-inch paper. Either the original ribbon copy on Cornell bond paper, or a good quality Xerox copy, should be bound in black cloth and lettered both on the front and on the spine of the volume. An appropriate copy must be presented to the student's faculty adviser. Further directions concerning the form in which the report is to be submitted may be obtained from either the student's faculty adviser or the Office of the Dean of the Graduate School of Nutrition.

The written report of the special research problem and the final oral examination must be completed by the deadline set by the Graduate School

in order to graduate the same term. Degrees are conferred in January, June, and September of each year.

Orientation Requirements

Prior to registration, all new M.N.S. candidates are requested to attend an orientation program, which includes an introductory meeting, a tour of Savage Hall, and meetings with the core faculty professors.

During this orientation, each student will meet individually with an advisory committee of three or four faculty professors who will help him formulate his academic program for the fall term according to his previous experience, future goals, and the required curriculum for graduation. These interviews last for about a half hour per student.

Also during the orientation program, each of the core faculty professors (and representatives from the joint faculty) will meet with the group of new students to discuss his specialization in nutrition and to describe his current research programs. With the same purpose in mind, each student is encouraged to arrange throughout the first term subsequent meetings with other joint faculty members. The student must choose his adviser and specialization by mid-October. The selected adviser will direct the student's research problem and assume the advisory committee's duties of formulating the student's curriculum for the M.N.S. degree.

Residence Requirements

Residence will vary with the candidate's background, training, and experience; but to receive a degree from the Graduate School of Nutrition, a student must complete at least two units of residence at the School after receiving a Bachelor's degree from Cornell or elsewhere. Full-time study for one semester with satisfactory accomplishment constitutes one residence unit. In most instances, the time required to obtain the degree exceeds the minimum requirements and generally takes two academic years plus the intervening summer.

Tuition and Fees

REGISTRATION FEE. A registration fee of $35 must be made by every applicant accepted for admission unless the candidate has previously matriculated as a student at Cornell University. A check or money order payable to Cornell University should be remitted to the Graduate School, Sage Graduate Center, upon notification of acceptance. This fee pays the matriculation fee, chest x-ray fee, and examination book charge, and covers certain expenses incurred at graduation if the student receives a degree. The fee will not be refunded to any candidate who withdraws his application after May 22, or after twenty days following his admission approval. This fee is *not* covered by University fellowships, scholarships, or assistantships.

TUITION. The tuition for students registered in the Graduate School of Nutrition is $200 per term payable at the beginning of each term. Certain assistantships carry a waiver of tuition.

GENERAL FEE. A General Fee of $337.50 a term payable at the beginning of each term is required of each registrant of the Graduate School of Nutrition. The General Fee contributes toward the services supplied by the libraries, Gannett Clinic, Sage Infirmary, and the student union in Willard Straight Hall, and pays a portion of the extra cost of laboratory courses and general administration.

SUMMER SESSION FEE. All students of the Graduate School of Nutrition who attend classes or do research in the Summer Session must register both in the Graduate School and in the Summer Session to receive credit. Registration forms are provided by the Office of the Registrar and administered by the Office of the Summer Session. The rate of tuition is $70 per credit hour; the General Fee is $5 per week.

IN ABSENTIA. A graduate student registered *in absentia* must pay a fee of $35 each term.

LIMITED REFUNDS. Limited refunds of the tuition and General Fee will be made to students who withdraw from the University prior to completion of a term, for reasons accepted as satisfactory. If a student terminates a University registration, tuition and General Fee will be charged beginning with registration day to the effective date of the certificate as issued by the school as follows: first week, 10 percent; second week, 20 percent; third week, 30 percent; fourth week, 40 percent; fifth week 60 percent; sixth week, 80 percent; seventh week, 100 percent; except no charge is made if the withdrawal is effective within the first six days. However, the charge will be made according to the number of instructional days elapsed if a student leaves for one of the following reasons: completion of degree requirements, military service, or on recommendation of the University Health Services. A student arranges for withdrawal at the Graduate School Office in Sage Hall. No part of the registration fee is refundable.

The amount, time and manner of payment of tuition, fees, or other charges may be changed by the Board of Trustees at any time without previous notice.

Assistantships and Traineeships

A number of assistantships are available in the School's research programs, and any student admitted to the School may apply. There are also traineeships available to U.S. citizens who intend to continue to the Ph.D. degree, using the M.N.S. as an intermediary step. Applications should be made in writing to the Secretary, Graduate School of Nutrition. No special application forms are provided. The term of and stipend for each appointment are determined on an individual basis after the student has been accepted by the Graduate School. For September appointments, applications should be made by March 1, and announcement of appointments will be made on or about April 1. Late applications will be considered.

Traineeships in Public Health

Students interested in preparing for positions as public health nutritionists may apply for public health traineeship awards from the United States Public Health Service. Applicants may secure application forms and additional information from any of the regional medical directors of the United States Public Health Service or from:

Chief, Health Manpower Grants Branch
Division of Health Manpower Educational Services
Public Health Service, DHEW
Bethesda, Maryland 20014

Health Services and Medical Care

Health services and medical care for students are centered in two Cornell facilities: the Gannett Medical Clinic (outpatient department) and the Sage Infirmary. Students are entitled to unlimited visits to the Clinic. Students are urged to make an appointment with a physician at the Clinic either by telephoning (256-4082) or by coming to the Clinic in person, although an acutely ill student will be seen promptly whether he has an appointment or not. Students are also entitled to most laboratory and x-ray examinations indicated for diagnosis and treatment, hospitalization in the Sage Infirmary with medical care for a maximum of fourteen days each semester, and emergency surgical care. The cost of these services is covered in the General Fee.

On a voluntary basis, insurance is available to supplement the services provided by the General Fee. For further details, including charges for special services, see the *Announcement of General Information.* If, in the opinion of the University authorities, the student's health makes it unwise for him to remain in the University, he may be required to withdraw.

If a student prefers to consult a private physician rather than go to the Clinic, or to have the services of a private doctor while a patient in the Infirmary, he must bear the cost of these services.

Graduate Housing

Residence Halls

The University has two residence halls for graduate students. The Sage Graduate Center accommodates 190 men and women; Cascadilla Hall houses 155 men and women. The dining service in the Sage Graduate Center is available to all graduate students and faculty. Graduate students who wish to apply for housing should write to the Department of Housing and Dining Services, 223 Edmund Ezra Day Hall, when their plans to enter the University are complete.

Married Students

Unfurnished apartments for 420 married students and their families are provided by Cornell in the Cornell Quarters (81 apartments), Pleasant Grove (94 apartments), and Hasbrouck (245 apartments).

Off-Campus Housing

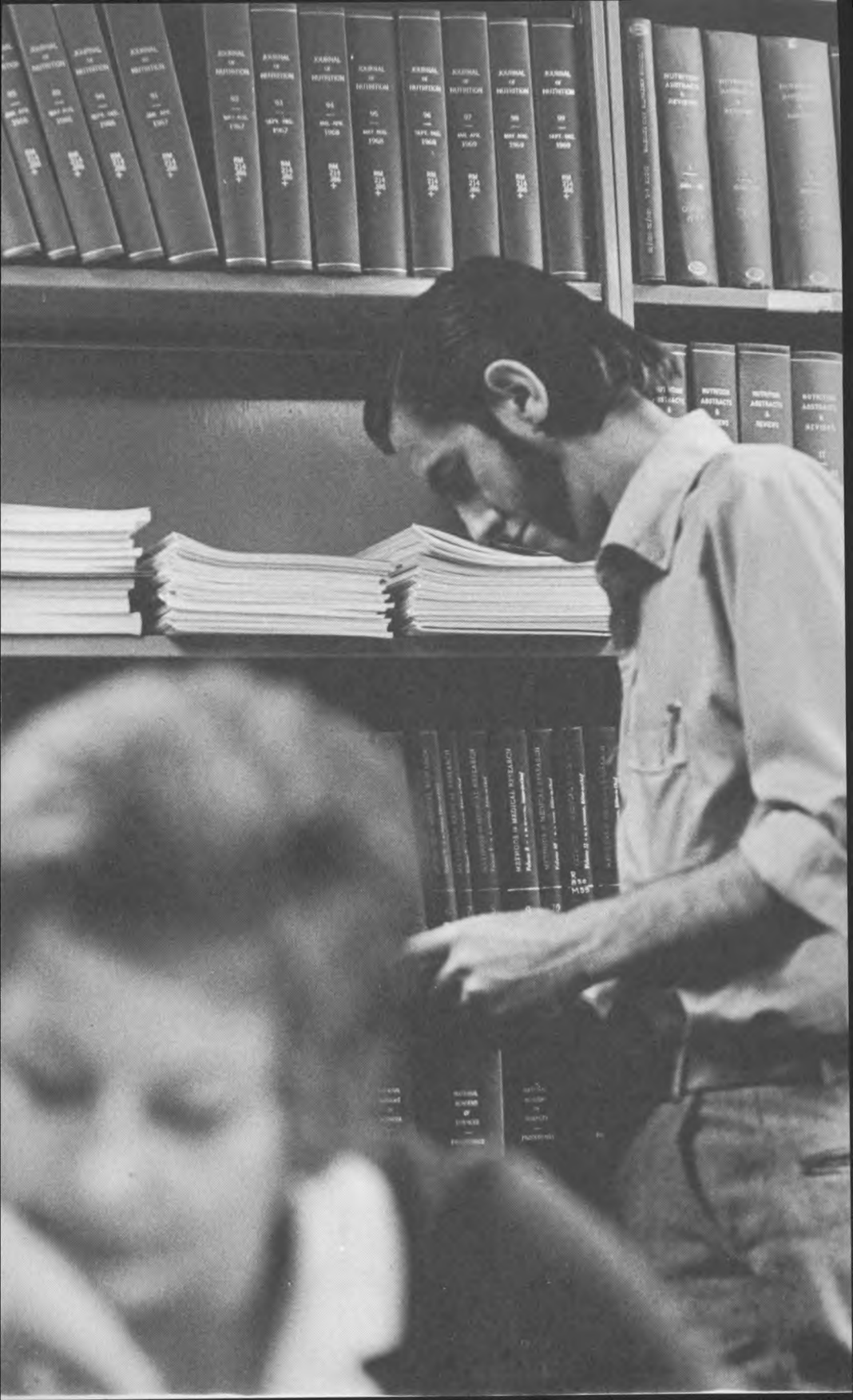
Information on housing that is currently available may be obtained at the Off-Campus Housing Office in 223 Edmund Ezra Day Hall. Because changes of available accommodations occur daily, it is not practical to prepare lists. If possible, a student should make at least one trip to Ithaca to look over the available apartments and houses before he plans to take up residence.

DETAILED INFORMATION on all types of housing for students may be obtained by writing to the Department of Housing and Dining Services, Edmund Ezra Day Hall.

Undergraduate Advisory Service

A Cornell undergraduate in the College of Agriculture, Arts and Sciences, or Human Ecology who is interested in graduate work in nutrition may obtain guidance in planning his undergraduate curriculum from members of the faculty of the Graduate School of Nutrition. Courses are recommended by the adviser to provide the undergraduate with the best background for continuing in the M.N.S. degree program in his chosen area of specialization in nutrition.

The Reference Room in Savage Hall is maintained for the convenience of the faculty and students of the Graduate School of Nutrition.


JOURNAL OF NUTRITION
NUTRITION ABSTRACTS & REVIEWS
QP 141 M55

Description of Courses

The following list of courses includes both those specified previously as required for the degree offered and some of those from which the student may select electives, with the approval of his faculty adviser, in accordance with his specific area of interest.

The information in parentheses following the name of the course refers to the department or the division in which the course is given, and the course number. In registering for any course, list the course number and the department or division, rather than the name of the course. The times and rooms for courses are not always available at printing. To obtain course times and rooms the student should consult the specific departmental office, the individual *Announcements* issued by the colleges concerned, or the Cornell University Course and Room Roster available at registration. Information in brackets indicates that the course is not given in 1971–72.

The courses are grouped as follows:

NUTRITION: General, Human Nutrition, Animal Nutrition

BIOCHEMISTRY, CHEMISTRY, AND PHYSICS

PHYSIOLOGY AND PHYSICAL BIOLOGY

MATHEMATICS, STATISTICS, AND RESEARCH DESIGN

FOOD SCIENCE AND MICROBIOLOGY

SOCIAL SCIENCES: Economics and Food Marketing, Sociology and Anthropology, Education and Public Health

SEMINARS: Nutrition, Biochemistry, Other Seminars

Nutrition

In this area some courses are more oriented toward human nutrition and others are more oriented toward animal nutrition. Since courses based on experimental animal nutrition are often fundamental to a knowledge of human nutrition, a clear-cut distinction is not implied in the following course groupings.

General

General Nutrition (Graduate School of Nutrition 620). Fall term. Credit three hours. Prerequisite: permission of the instructor. Lectures, M W F 11:15. Savage 130. Professor Lutwak and staff.

This course is offered to students whose principal academic training has been in a field other than nutrition. It is designed to meet their need for a basic but intensive introduction to the principles, history, and applications of nutrition.

Special Topics in Nutrition (Graduate School of Nutrition 660). Throughout the year. Maximum of three credit hours per term. Registration by permission. Graduate School of Nutrition faculty.

Designed for the student who wishes to become well informed in any specific topic he selects which is related directly or indirectly to nutrition. The course may include individual tutorial study, experience in research laboratories, a lecture series on a special topic selected by a professor or a group of students, and/or selected lectures of a course already offered. Topics can be changed so that the course may be repeated for credit.

Special Problem (Graduate School of Nutrition 710). Throughout the year. Six credit hours. Report of an individual problem under the direction of any member of the faculty of the Graduate School of Nutrition. (See p. 21 for details.)

Advanced Nutrition Series

A series of nutrition courses offered jointly by the Department of Human Nutrition and

Food, College of Human Ecology; the Departments of Animal Science and of Poultry Science, College of Agriculture; and the Graduate School of Nutrition. Prerequisites: courses in nutrition, physiology, and biochemistry to include intermediary metabolism; or permission of the instructor.

The biochemical and physiological bases of digestion, absorption, transport and metabolism of nutrients; species differences where applicable; and historical as well as current concepts in nutrition.

Proteins and Amino Acids (Human Nutrition and Food 501). Fall term. Credit two hours. Lectures, W F 10:10. Van Rensselaer NG-6. Professor Morrison.

Lipids and Carbohydrates (Poultry Science 502). Fall term. Credit two hours. Lectures, T Th 11:15. Rice 300. Associate Professor Bensadoun.

Nutritional Energetics (Animal Science 503). Spring term. Credit two hours. Lectures, M W 10:10. Morrison 342. Professor Reid.

Vitamins and Essential Inorganic Elements (Poultry Science 504). Spring term. Credit two hours. Lectures, T Th 11:15. Rice 201. Professor Scott.

Pathology of Nutritional Diseases (Veterinary Pathology 931). Spring term. Prerequisite: Veterinary Pathology 630 and 631. Lecture and laboratory hours to be arranged. Designed primarily for graduate students of nutrition. Given in even years. Professor Krook.

Human Nutrition

International Nutrition Problems, Policy, and Programs (Graduate School of Nutrition 580). Fall term. Credit three hours. Registration by permission. Lectures, T Th 11:15–12:45. Savage 130. Professor Latham.

A review of food and nutrition problems, policy, and programs especially as they relate to developing countries. Emphasis is placed on the need to coordinate the efforts of various government ministries or departments including those of agriculture, education, economics, health, and community development. Among topics discussed are planning and evaluation of applied nutrition programs; education and training in nutrition; the importance of social and cultural factors; methods of increasing the use of protein-rich foods; assessment of nutritional status; the role of FAO, WHO, UNICEF, and other agencies; action in case of famine; the integration of nutrition with other projects of disease control in developing countries.

Clinical and Public Health Nutrition (Graduate School of Nutrition 650). Spring term. Credit three hours. Prerequisites: a course in nutrition, in physiology, and in biochemistry. Registration by permission of the instructor. For graduate students only. Lectures to be arranged. Professor C. M. Young and Associate Professor Roe.

Designed to familiarize the student with some of the applications of nutrition to clinical and public health problems.

Maternal and Child Health Nutrition (Human Nutrition and Food 222). Fall and spring terms. Credit three hours. Prerequisite: Human Nutrition and Food 115A. Human nutrition and food majors electing this course must do so before taking Human Nutrition and Food 332. Lectures and discussion, M W F 1:25. Van Rensselaer. Associate Professor Newman.

Nutritional needs during human growth and reproduction; relationship between maternal and child health; meeting the dietary needs of infants and children, and of women during the reproductive period.

Principles of Human Nutrition (Human Nutrition and Food 332). Spring term. Credit three hours. Prerequisites: Human Nutrition and Food 115A and a college course in biochemistry and in physiology. Lecture-discussion, T Th 9:05–10:30. Van Rensselaer. Associate Professor Newman.

Principles of human nutrition for the student planning to work professionally in this area. Use of the scientific literature to examine methods of assessing nutritional needs and nutritional status, and to study physiological and environmental factors to be considered in solving human nutrition problems. Emphasis will be on nondisease states and, when possible, nutrition topics of current national interest will be used to illustrate the principles.

Nutrition and Disease (Human Nutrition and Food 441). Fall term. Credit three hours. Prerequisite: Human Nutrition and Food 332 or equivalent. Discussion, M W F 8. Van Rensselaer. Associate Professor Rivers.

Study of the physiological and biochemical anomalies in certain diseases and the principles underlying nutritional therapy. Independent survey of the technical literature in this field.

Community Nutrition and Health (Human Nutrition and Food 445). Spring term. Credit three hours. Prerequisite: Human Nutrition and Food 246 and 332, or permission of the instructor. Lecture, W F 1:25. Laboratory or field work, M 1:25–4:25. Assistant Professor Hepburn.

Study of biological and environmental dimensions of human nutritional problems in

contemporary society; and application of basic concepts of food and nutrition to the improvement of man's health, evaluation of federal, state, and community programs focused on improving man's nutrition. Laboratory work includes *(a)* developing materials for field studies and evaluation, and *(b)* projects and field trips in nearby communities. Field experiences will be selected and developed to expose students to food and nutrition problems of man over his entire life span from infancy to old age.

Nutrition and Growth (Human Nutrition and Food 512). Fall term. Credit two hours. Prerequisite: Human Nutrition and Food 332 or permission of instructor. Signature of instructor required for undergraduate students. Lectures, W F 9:05. Van Rensselaer. Associate Professor Newman.

Aspects of human physical and chemical growth of particular interest to nutritionists. Survey of methodology; comparison of individual growth patterns of selected body dimensions with group patterns; consideration of some of the variables, including diet, which influence growth.

Readings in Nutrition (Human Nutrition and Food 514). Spring term. Credit three hours. Prerequisite: Human Nutrition and Food 332 or equivalent. Lectures, T Th 11:15 and an additional hour to be arranged. Associate Professor Snook.

Critical review of literature on selected topics in the field of nutrition. Emphasis on human nutrition. Topics are changed each term so the course may be repeated for credit with permission of the instructor.

Seminar in Perspectives of Human Nutrition and Food (Human Nutrition and Food 515). Spring term. Credit three hours. Lectures, M W F 9:05 with one additional discussion period to be arranged. Assistant Professor Devine.

An introduction to the study of food and nutrition for graduate students who have had limited or no work in this area. Students attend the lectures of Human Nutrition and Food 115A. A critical review of research on selected nutritional problems utilizes these lectures and supplemental readings.

Research Methods in Human Metabolic Studies (Human Nutrition and Food 524). Spring term. Credit three hours. Prerequisites: Human Nutrition and Food 332 or equivalent, laboratory experience in biochemistry or quantitative analysis, and permission of the instructor. Lecture and laboratory, T Th 2–4:25. Van Rensselaer 353. Associate Professor Schwartz and faculty.

Principles of human metabolic research; experimental design of human studies; dietary considerations; methods of collecting and analyzing biological material; and evaluation. Laboratory will include planning and management of a metabolic study, collection and the appropriate analysis of blood, urine, and feces.

Animal Nutrition

Principles of Animal Nutrition (Animal Science 410). Fall term. Credit three hours. Prerequisites: a course in human or veterinary physiology and a course in organic chemistry or biochemistry, or permission of instructor. Lectures, M W F 10:10. Morrison 163. Professor Loosli, Professor Nesheim, and Assistant Professor Hintz.

The chemistry and physiology of nutrition and the comparative nutritive requirements of maintenance, growth, reproduction, egg production, and lactation.

Principles of Animal Nutrition, Laboratory (Animal Science 411). Fall term. Credit one hour. Must be concurrently registered in 410. Enrollment limited to twelve students. Registration by permission only. Time to be arranged. Professor Nesheim and Assistant Professor Hintz.

Laboratory problems with animals will be designed to introduce the student to techniques of experimentation in nutrition.

Laboratory Work in Animal Nutrition (Animal Science 511). Fall term. Credit three hours. Prerequisites: quantitative analysis and Animal Science 410 or its equivalent, or permission of the instructor. Lectures, M W F 2–4:25. Morrison 342 and 443. Professor Warner.

Each student engages in a series of short research projects with experimental animals, such as rats, rabbits, and sheep. Both classical and modern techniques of animal experimentation are considered. The applications of biochemical methods to the solution of animal nutrition problems are stressed.

Biochemistry, Chemistry, and Physics

Principles of Biochemistry, Lectures (Biological Sciences 431). Fall and spring terms. Credit four hours per term. Prerequisite: Organic Chemistry 353–355 or the equivalent. Fall term lectures, M 8, Morrison 146; T Th S 8, Ives 120. Professor Daniel. Spring term lectures, M W F 10:10 and discussion period to be arranged. Assistant Professor Edelstein.

A basic course dealing with the chemistry of biological substances and their transformations in living organisms.

Principles of Biochemistry, Laboratory (Biological Sciences 433). Spring term. Credit three hours. Prerequisite: quantitative analysis or permission of the instructor. Biological Sciences 431 may be taken concurrently. Laboratory M W 2–4:25. Wing 106. Discussion period, M 1:25. Riley-Robb 105. Associate Professor Neal, section A; and Assistant Professor Fessenden-Raden, section B.

Laboratory practice with biochemical substances and experiments designed to illustrate basic biochemical principles and techniques.

Biochemistry of the Vitamins (Biological Sciences 530). Spring term. Credit two hours. Given in alternate years. Prerequisites: Chemistry 353–355 and Biological Sciences 431 or their equivalent. Lecture, T Th 10:10. Savage 100. Professor Daniel.

The chemical and biochemical aspects of the vitamins.

Intermediate Biochemistry, Lectures (Biological Sciences 531–532). Fall and spring terms. Credit four hours a term. Prerequisites: Chemistry 358 or Biological Sciences 431, or consent of the instructor. Physical chemistry desirable. Lectures, M W F S 9:05. Riley-Robb 125. Fall semester: Associate Professor Calvo and staff; Spring semester: Associate Professor Guillory and staff.

The major areas of biochemistry will be covered in some detail. Appropriate for students who have previously had a one-semester introductory biochemistry course. Fall semester: proteins, enzymes, and the nature of enzymatic catalysis; carbohydrate metabolism; nitrogen metabolism. Spring semester: energetics; lipid metabolism; biosynthesis of informational macromolecules.

Intermediate Biochemistry, Laboratory (Biological Sciences 533). Fall term. Credit three hours. Prerequisite: Chemistry 287–288 or 389–390. Must be taken with or following Bio. Sci. 531. Laboratory, T or Th 9:05–4:25. Wing 106, 107. One discussion period to be arranged. First meeting for both sections will be held on the first Tuesday at 9:05. Professor Nelson, Associate Professor Wharton, and Assistant Professor McCarty.

Selected experiments on carbohydrates, proteins, amino acids, and metabolism (cellular particles, kinetics, general enzymology) will be given to illustrate basic biochemical principles. The course will emphasize the quantitative aspects rather than qualitative identifications.

Advanced Biochemistry (Biological Sciences 633–638). Throughout the year. Lectures and seminars on specialized topics, three topics per term. Credit one hour per topic. Prerequisite: Biological Sciences 532 or consent of instructor. May be repeated for credit. The following fields will be covered (each field is divided into three related topics): Enzyme Structure and Mechanism of Action (Fall 1972); Aspects of Protein and Nucleic Acid Synthesis (Spring 1971, 1973); Structure, Function and Synthesis of Biological Membranes (Fall 1971, 1973); Aspects of Metabolic Pathways and their Control (Spring 1972, 1974).

Structure of Biological Membranes (Biological Sciences 633). Fall term 1971. T Th 9:05. Savage 100. First four and one-half weeks of term. Professor Zilversmit.

Structure and Function of Mitochondrial and Chloroplast Membranes (Biological Sciences 635). Fall term. T Th 9:05. Savage 100. Middle four and one-half weeks of term. Professor Racker.

Biogenesis of Membranes (Biological Sciences 637). Fall term. T Th 9:05. Last four and one-half weeks of term. Associate Professor Schatz.

Regulatory Aspects of Photosynthesis (Biological Sciences 634). Spring term 1972. T Th 9:05. Savage 100. First four and one-half weeks of term. Associate Professor McCarty.

Regulatory Aspects of Respiration (Biological Sciences 636). Spring term. T Th 9:05. Savage 100. Middle four and one-half weeks of term. Associate Professor Wharton.

Regulatory Aspects of Muscle Contraction (Biological Sciences 638). Spring term. T Th 9:05. Savage 100. Last four and one-half weeks of term. Associate Professor Guillory.

Biochemistry of Gastrointestinal Fermentation (Animal Science 505). Fall term. Credit two hours. Prerequisites: quantitative analysis, Animal Science 410, and Biological Sciences 431, or permission of the instructor. Lectures, to be arranged. Morrison 342 and 301. Associate Professor Van Soest.

Gastrointestinal fermentations in relation to utilization of cellulosic materials as food. Chemical composition of plants and factors affecting their nutritive value.

Introductory Quantitative Analysis (Chemistry 236). Spring term. Credit four hours. Enrollment limited. Prerequisite: Chemistry 108 or advanced placement in chemistry. Lectures, T Th 12:20. Laboratory, M W or T Th 1:25–4:25, or F 1:25–4:25 and S 8–11, if warranted by sufficient registration. Preliminary examinations may be given in the evening. Professor Morrison and assistants.

A study of the fundamental principles of quantitative chemistry. Laboratory experiments are designed to illustrate basic principles and practice of quantitative procedures.

Introductory Physical Chemistry (Chemistry 287–288). Throughout the year. Credit three hours a term. Prerequisites: Chemistry 108 or 116 and Mathematics 111–112 or consent of the instructor. Chemistry 287 is prerequisite to 288. Lectures, W F 9:05; occasional lectures and examinations, M 9:05. Recitation, M W or F 1:25.

A systematic treatment of the fundamental principles of physical chemistry.

Introductory Organic Chemistry (Chemistry 357–358). Throughout the year. Credit three hours a term. Prerequisite: Chemistry 108 or 116, or advanced placement in chemistry. Chemistry 357 is prerequisite to Chemistry 358. Parallel registration in Chemistry 355–356 is recommended. Lectures, M W F 9:05. Preliminary examinations may be held in the evening. Fall term, Professor Wilcox; Spring term, Professor Meinwald.

A systematic study of the more important classes of carbon compounds, reactions of their functional groups, methods of synthesis, relations, and uses.

General Physics (Physics 101–102). Throughout the year. Credit four hours a term. Prerequisite: three years of college preparatory mathematics. Physics 101 (or 207) is prerequisite to 102. Similar to but less analytically demanding than Physics 207–208. Demonstration lectures, M W 9:05 or 11:15. Two discussion hours per week and a two-hour laboratory period, on alternate weeks, as assigned. Two preliminary examinations will be held. Professor Greisen and staff.

Evolution and present form of the basic principles of physics, treated quantitatively but without calculus. Major topics in the first term are mechanics, conservation laws, heat, wave motion, and optics. The second term includes electricity and magnetism; relativity; elementary particles; quantum physics; and structure of atoms, nuclei, and solids. Laboratory emphasis on instruments, measurement, and interpretation of data. At the level of *An Introduction to the Meaning and Structure of Physics*, by L. N. Cooper (1968).

Instrumental Methods (Food Science 512). Spring term. Credit five hours. Prerequisite: permission of the instructor. Lectures, M W F 11:15. Stocking 120. Laboratory, M or T 1:25–4:55. Stocking 209. Assistant Professor Sherbon. Given in alternate years. Offered in 1971.

Deals with instrumental methods widely used in research and industry. The major emphasis is on chromatography, spectroscopy, electrophoresis, ultracentrifugation, thermal analysis, and the use of computers. The stress will be on the practical use of the material presented.

Physiology and Physical Biology

Histology: The Biology of the Tissues (Biological Sciences 313). Fall term. Credit four hours. Prerequisite: a two-semester introductory biology sequence; comparative anatomy and organic chemistry or biochemistry desirable. Lectures, T Th 11:15. Stimson G-1. Laboratory, T Th 8–9:55 or 2–4:25. Fernow 14, 16. Professor Wimsatt.

A general course dealing with the biology of the tissues to provide the student with a basis for understanding the microscopic and fine structural organization of vertebrates and the methods of analytic morphology at the cell and tissue levels. The dynamic interrelations of structure, chemical composition, and function in cells and tissues are stressed.

General Animal Physiology, Lectures (Biological Sciences 410). Spring term. Credit three hours. Prerequisite: one year of biology; courses in chemistry, organic chemistry, physics, and biochemistry desirable. Lectures, M W F 10:10. Stimson G-25. Assistant Professor Howland.

The principles of animal physiology are developed through consideration of the functioning of cells, tissues and organs. Specific topics discussed include respiration, metabolism, circulation, excretion, chemical integration, muscle contraction, nerve action, and sensory reception. A quantitative, systems-theoretical approach is emphasized.

General Animal Physiology, Laboratory (Biological Sciences 410A). Spring term. Credit two hours. Prerequisite: Biological Sciences 413 or equivalent must be taken concurrently. Lecture, W 2, alternate weeks only. Stimson G-25. Laboratory, T 8–11 or M T Th or F 1:25–4:25, alternate weeks, Stimson 306. Assistant Professor Howland.

Students are introduced to basic techniques utilized in the study of the physiology of animal tissues. Experiments cover topics dealing with respiration, properties of muscle, circulation, activity of nerves, and osmotic phenomena.

Intermediate Human Physiology (Graduate School of Nutrition 570). Spring term. Credit four hours. Prerequisite: a course in biochemistry or consent of the instructor. Lectures, M W F 9:05 plus weekly demonstrations to be arranged. Associate Professor Roe and staff.

Lectures on the major functional systems of the mammalian body with special reference to man. Special topics will include the physiology of growth, pregnancy, aging, and adaptation to environmental change.

[Special Histology: The Biology of the Organs (Biological Sciences 412). Spring term. Credit four hours. Prerequisite: Biological Sciences 313, or consent of instructor. Enrollment limited to eighteen students. Lectures, W F 9:05. Stimson 105. Laboratory, W F 2–4:25. Fernow 14. Given in odd years. Staff. Not given in 1972.

A continuation of Biological Sciences 313. The microscopic and ultrastructural organization of the principal vertebrate organ systems are studied in relation to their development, functional interaction, and special physiological roles. Biological Sciences 313 and 412 together present the fundamental aspects of the microscopic and submicroscopic organization of the vertebrate body from a physiological perspective. The organization of the course involves student participation in "lecture-seminars" and the prosecution of independent project work supplementary to the regular work of the laboratory. The latter enables students to gain practical experience with histological and histochemical preparative techniques.]

Mammalian Physiology (Biological Sciences 414). Spring term. Credit six hours. Registration by permission. Prerequisite: a year of biological sciences. Courses in biochemistry, histology, and gross anatomy desirable. Lectures, M W F 8. Morrison 167. Discussion, S 10:10. Morrison 167. Laboratory, M or W 1:25. Morrison 174. Professors Gasteiger, Hansel, and Visek (in charge), and Associate Professor Bensadoun.

A general course in mammalian physiology including circulation, respiration, digestion, metabolism, renal function, endocrinology, and the nervous system.

Fundamentals of Endocrinology (Animal Science 427). Fall term. Credit four hours. Prerequisite: a course in human or veterinary physiology, or consent of the instructor. Lectures, T Th S 10:10. Morrison 167. Laboratory, to be arranged. Professor Hansel.

A general course in the physiology of the endocrine glands, and the roles played by each hormone in the regulation of normal body processes. The laboratory work consists of a series of experiments designed to illustrate the basic principles of endocrinology.

Radioisotopes in Biological Research: Principles and Practice (Veterinary Physical Biology 921). Spring term. Credit four hours. Lectures, T Th 11:05. Laboratory, M T or W 1:30–5. Prerequisites: a course in quantitative chemistry and permission of instructor. Professor Lengemann and staff.

Lectures, demonstrations, and laboratory on the fundamentals of atomic energy procedures and applications to biological research.

Biological Effects of Radiation (Veterinary Physical Biology 922). Fall term. Credit two hours. Lectures, T Th 10:10. Laboratory, Th 1:30–4:25. Associate Professor Casarett.

Lectures and demonstration on radiation physics, radiation chemistry, radiation effects at the cellular level, radiation effects in multicellular organisms, genetic effects of radiation, and radioprotective and radiomimetic substances.

Biological Membranes and Nutrient Transfer (Veterinary Physical Biology 923). Spring term. Credit two hours. Prerequisites: animal or plant physiology, quantitative and organic chemistry, physics, and consent of instructor. Cellular physiology and elementary physical chemistry desirable. Time and place to be arranged. Offered in even years. Professor Wasserman.

An introduction to elementary biophysical properties of biological membranes, theoretical aspects of permeability and transport, and mechanism of transfer of inorganic and organic substances across intestine, placenta, kidney, erythrocytes, bacteria, and other biological systems.

Mathematics, Statistics, and Research Design

Calculus (Mathematics 111). Either term. Credit three hours. Prerequisite: three years of high school mathematics, including trigonometry. Lectures, fall term: T Th 11:15, 12:20, plus one hour to be arranged. Lectures, spring term: T Th, 9:05, plus one hour to be arranged.

Plane analytical geometry, differentiation and integration of algebraic and trigonometric functions, applications.

Calculus (Mathematics 112). Either term. Credit three hours. Prerequisite: Mathematics 111. Lectures, fall term: T Th 12:20, plus one hour to be arranged. Lectures, spring term: T Th 9:05, plus one hour to be arranged.

Differentiation and integration of elementary transcendental functions, the technique of integration, conic sections, polar coordinates, infinite series.

Design of Survey Samples (Industrial and Labor Relations 310). Spring term. Credit

three hours. Prerequisite: one term of statistics.

Application of statistical methods to the sampling of human populations. A thorough treatment of the concepts and problems of sample design with respect to cost, procedures of estimation, and measurement of sampling error. Analysis of nonsampling errors and their effects on survey results (e.g., interviewer bias and response error). Illustrative materials will be drawn from the areas of market research and attitude and opinion research.

Computer Techniques for Statistics and Biology (Statistics and Biometry 407). Fall term. Credit two hours. Prerequisite or corequisite: an introductory course in statistics. Lecture, M 11:15. Laboratory, M 2. Associate Professor Searle.

Introduction to uses of computers in statistics using the Cornell University Programming Language (CUPL); calculation of elementary statistical analyses, techniques of sampling and simulation, preparation and availability of library programs.

Statistical Methods I (Statistics and Biometry 510). Fall term. Credit four hours. Prerequisite: graduate standing or permission of instructor. Lectures, M W F 9:05. Laboratory to be arranged. Examinations will be held at 7:30 p.m. on Wednesday evenings. Associate Professor Urquhart.

The distributions of statistics encountered in biological and other fields are considered from the point of view of elementary probability notions and by sampling from known populations. The results, with principles of experimentation, are applied to the conduct of experiments and interpretation of results. Topics include point and interval estimation, tests of hypotheses and of significance, the treatment of discrete data, methods involving rank sum procedures, the consideration of normal populations, the one-way analysis of variance and simple linear regression. Emphasis is placed on basic statistical principles, criteria for selection of statistical techniques and the application of these techniques to a wide variety of biological situations.

Statistical Methods II (Statistics and Biometry 511). Spring term. Credit four hours. Prerequisite: Statistics and Biometry 510 or the equivalent. Lectures, M W F 9:05. Laboratory to be arranged. Examinations will be held at 7:30 p.m. on Wednesday evenings. Associate Professor Urquhart.

The work of Statistics and Biometry 510 is continued. Topics include multiple and curvilinear regression, complex analyses of variance and covariance. The analysis of variance discussion considers treatment designs, single degree of freedom contrasts, the simpler experimental designs, sampling errors, fixed, mixed, and random models, and the effect of disproportionate numbers. When appropriate, the computer is considered as the reasonable way to have calculations done.

Economic and Social Statistics (Industrial and Labor Relations 510). Fall and spring terms. Credit three hours. Professor McCarthy.

A nonmathematical course for graduate students in the social studies without previous training in statistical methods. Emphasis will be placed on discussion of technical aspects of statistical analysis and on initiative in selecting and applying statistical methods to research problems. The subjects ordinarily covered will include analysis of frequency distributions, regression and correlation analysis, and selected topics from the area of statistical interference.

Introduction to Computer Use (Development Sociology 540). Fall and spring terms. Credit two hours. Prerequisite: one course in statistics. Lectures, T Th 11:15. Assistant Professor Eberts.

An introductory course in the computer system at Cornell for the student who wishes to use the computer in his research but who does not necessarily want to become a programmer. The course is divided into two parts. The first part is designed to give the student a working knowledge of the elementary aspects of Fortran IV so that he will be able to do preliminary transformations of his data and simple Fortran programs. The second part deals with the various "canned" programs which are most often used by social scientists. The student is introduced to program packages such as Michigan, Bimed, and SSP. Instruction will be given on running the programs as well as discussing the differences between them.

Research Design and Analysis in the Social Sciences (Consumer Economics and Public Policy 501). Spring term. Credit three hours. Prerequisites: introductory statistics and permission of the instructor. Lectures, W 2:30–4:25. Laboratory to be arranged.

The course is a general introduction to the design and analysis of research. The emphasis will be on survey research methods for social and economic studies. A two-hour weekly laboratory session will be held in which data from a research project in progress will be analyzed to provide experience in applying the concepts and techniques developed in lecture sessions.

Research Design (Development Sociology 515). Spring term. Credit three hours. Warren 131. Lectures, T Th 1:25–2:55. Assistant Professor Francis.

An introduction to the methods of social research. Course topics follow the major steps in the design and execution of sociological research from the definition of the problem and formulation of hypotheses to the interpretation of results and preparation of a final report. Practice exercises are assigned each week utilizing data from departmental projects.

Cross-Cultural Research Methods (Development Sociology 516). Spring term. Credit three hours. Prerequisite: Development Sociology 515 or permission of the instructor. Lectures, W F 1:25–2:40. Warren 131. Professor Young.

The comparative study of large social systems is presented as a new research style that is especially appropriate to research in and on developing countries. The field technique of macrosurveys is considered in detail, but the uses of available data such as national social accounting, documents, ethnographic reports, and aerial photographs are emphasized. Special attention is given to trend studies, the assumptions of macrostructural analysis, rapid, low-cost research procedures, and the mechanics of data archives.

Food Science and Microbiology

International Food Development (Food Science 403). Fall term. Credit three hours. Lectures, M W 2–4:25. Given in odd years. Professor Kosikowski.

A study of programs, technical problems, and progress associated with developing, processing, and marketing acceptable food supplies in critical world areas. Proposals for increasing world protein resources for the human are to be discussed. Special attention is given to the organization, operations, relationships, and contributions of United Nations technical agencies, FAO, UNICEF, WHO, and governmental and nongovernmental organizations in the field.

Proteins (Food Science 501). Fall term. Credit three hours. Lectures, W F 8. Stocking Hall. Given in odd years. Associate Professor Sherbon and assistants.

The first part of the course will deal with the general properties of proteins: structure, preparation, and reactions. The second part will deal with proteins as part of food systems, occurrence and composition, associations and structures, and reactions to processing. Assigned readings, writing, and exercises will be used to insure the students obtain a working knowledge of current research in the area.

[Food Lipids (Food Science 502). Fall term. Credit two hours. Open to graduate students. Lectures, W F 12:20. Stocking 119. Given in even years. Assistant Professor Kinsella. Not offered in 1971.

This course covers the disposition of lipid materials in foods and the manner in which lipids influence the chemical and physical attributes of various foods. The effects of production techniques, storage, heating, refrigeration and enzymes on food lipids are described, and the chemical mechanisms involved are elucidated. The importance of lipids in the formation of food flavors is discussed.]

Food Carbohydrates (Food Science 503). Spring term. Credit two hours. Prerequisite: Biological Sciences 431 or the equivalent. Given in even years. Assistant Professor Hood.

A consideration of the chemistry of carbohydrates in foods including sugars, starches, pectins, gums, and cellulose. Emphasis will be placed on their origin in raw materials and the subsequent changes occurring during processing and storage.

Science of Food (Human Nutrition and Food 446A). Fall term. Credit three hours. Prerequisites: Human Nutrition and Food 246 and a college course in biochemistry. Lectures, T Th S 9:05. Professor Hester and Associate Professor Armbruster.

The relation to food quality of *(a)* rheological properties of food systems, *(b)* oxidation and reduction reactions, *(c)* enzymatic and nonenzymatic browning. Physical and chemical factors accounting for the color, flavor, and texture of natural and processed foods.

Science of Food, Laboratory (Human Nutrition and Food 446B). Fall term. Credit one hour. Prerequisite or concurrent: Human Nutrition and Food 446A. Laboratory, Th 1:25–4:25. Associate Professor Armbruster.

Laboratory experiments designed to illustrate the effect of varying ingredients and treatment on the quality characteristics of food products. Objective testing methods are used to determine food quality characteristics.

General Microbiology, Lectures (Biological Sciences 290A). Fall or spring term. Credit three hours. Prerequisites: Biological Sciences 101–102 or 103–104 and Chemistry 104 or 108 or the equivalent. Lectures, M W F 11:15. Stocking Hall. Fall term, Professor H. W. Seeley; spring term, professor to be appointed.

A study of the basic principles and relationships in the field of microbiology, with fundamentals necessary to further work in the subject. The course offering in the spring

term will provide special emphasis on the application of microbiology in home economics and agriculture.

General Microbiology, Laboratory (Biological Sciences 290B). Fall or spring term. Credit two hours. Laboratory, M W 2–4:25; T Th 8–11 or 2–4:25. Fall term, Professor H. W. Seeley; spring term, professor to be announced.

A study of the basic principles and techniques of laboratory practice of microbiology with fundamentals necessary to further work in the subject.

Advanced Bacteriology, Lectures (Biological Sciences 391A). Fall term. Credit three hours. Prerequisites: organic chemistry, Biological Sciences 290 or permission of the instructor, and biochemistry. Biochemistry may be taken concurrently. Lectures, M W F 9:05. Stocking 119. Associate Professor MacDonald.

A study of the comparative physiological and ecological relationships among bacteria and some related organisms. A number of groups of bacteria will be discussed in detail as well as factors which influence their ability to survive in nature. Parasitism, autotrophy, and evolution will be among the major topics discussed.

Advanced Bacteriology, Laboratory (Biological Sciences 391B). Fall term. Credit three hours. Prerequisites: concurrent registration in 391A and permission of the instructor. Limited enrollment. Preference given to those students planning to register for Biological Sciences 490B. Laboratory-lecture, M 1:25. Discussion, F 1:25. Stocking 321. Associate Professor MacDonald.

Techniques for the isolation, cultivation, and detailed study of selected groups of organisms. Some of the more standard techniques of physiological study will be introduced.

Dairy and Food Microbiology (Biological Sciences 394). Spring term. Credit four hours. Prerequisite: Biological Sciences 290A, 290B. Graduate students must have permission of the instructor. Lectures, M W 12:20. Stocking 119. Laboratory, M W 2–4:25. Stocking 301. Professor Naylor.

The major families of microorganisms of importance in dairy and food science are studied systematically with emphasis on the role played by these organisms in food preservation, food fermentation, and public health. The laboratory work includes practice in the use of general and special methods for microbiological testing and control of dairy and food products, as well as practice in the isolation and characterization of organisms found in foods.

Social Sciences

Economics and Food Marketing

Food Economics (Graduate School of Nutrition 590). Spring term. Credit three hours. Lectures, M W F 11:15. Savage 130. Professor Call.

Designed for students who are interested in any aspect of the food industry. Emphasis is placed on the economics of food production, processing, marketing, and consumption. Attention is given to both the United States and international food problems in a systematic treatment of economic principles applicable to the food sector of any economy.

Marketing (Agricultural Economics 240). Fall or spring term. Credit three hours. Lectures, M W F 11:15. One discussion period only, during the first week of the term: M T W Th or F 2:30–4:25 or S 9:05–11. Warren 45. Professor Goodrich.

A study of how food products are marketed. Special attention is given to the consumption of food products, factors that affect consumption, market channels, operation of different marketing agencies, storage, transportation, packaging, product identification, advertising and promotion, buying, selling, and costs.

Agricultural Policy (Agricultural Economics 351). Fall term. Credit three hours. Two lectures plus one discussion section each week. Lectures, T Th 9:05. Bradfield 101. Discussion sections, Th 11:15 or 1:25, or F 10:10. Warren 201. Professor Robinson.

A review of the history of public policies affecting agriculture in the United States and an analysis of the economic effects of alternative farm policies or programs, either proposed or adopted. Among the topics discussed are farm price support and surplus disposal programs, trade policies affecting agriculture, alternative measures to alleviate rural poverty, and farm politics.

Food Distribution (Agricultural Economics 441). Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, M W F 10:10. Warren 245. Mr. German.

A study of the structure and the competitive nature of the food industry. Particular attention is given to an analysis of the gross margin, expenses, earnings, and performance of food retailers. Government regulations with regard to mergers and buying and selling activities are examined. Leading food industry authorities frequently join the discussion session.

Economics of Agricultural Development (Agricultural Economics 464). Spring term. Credit four hours. Prerequisite: Agricultural Economics 150, or Economics 101–102, or con-

sent of the instructor. Lectures, T Th 9:05, and W 7–8:30 p.m. Warren 345. Professor Mellor.

A discussion of the special problems of agricultural development in low-per-capita-income areas and countries. Attention will be devoted to the relationship between development in agriculture and other sectors of the economy, capital and capital formation, the role of land and land reform, increasing efficiency in resource use, and coordination problems in agricultural development.

Food Merchandising (Agricultural Economics 541). Fall term. Credit two hours. Prerequisite: permission of instructor. Lectures, Th 2:30–4:25. Warren 261. Professor Brunk.

A seminar exploring alternative merchandising and promotional devices for food industry retailers and manufacturers. Special attention is given to identification and measurement of basic forces having an impact on consumer buying behavior.

World Food Economics (Agricultural Economics 560). Fall term. Credit four hours. Primarily for graduate students, but open to seniors with permission of the instructor. Prerequisite: at least two courses in economics. Lectures, M W 1:30–3:30, plus an individual weekly meeting with the instructor. Warren 101. Associate Professor Poleman.

Designed to introduce students in the social and biological sciences to food economics as it applies to developing countries—that is, to measurement of the food problem in specific situations and to identification of remedial measures consistent with economic reality. Examined are human food requirements, the major food groups and their economic characteristics (including least-cost diet analysis and historical trends in food consumption), techniques of national food accounting (including data collection and evaluation), the projection of demand, and the disaggregation of data for analysis of particular problem groups and areas. Although policy implications are drawn primarily from low-income tropical countries, a portion of the empirical evidence necessarily relates to more advanced economics. A major research paper is required.

Seminar on Latin American Agricultural Policy (Agricultural Economics 665). Fall term. Credit three hours. Prerequisite: basic economics. Knowledge of Spanish or Portuguese is desirable. Lectures, T 2:30–4:25, plus a weekly meeting with the instructor. Bradfield 105. Associate Professor Freebairn.

An examination of policies for the development of the agricultural sector in Latin America, including an identification of policy objectives and a review of the instruments of public policy implementation. Particular attention is paid to the contribution of research studies in agricultural policy formation and accomplishment.

Seminar in the Economics of Agricultural Development (Agricultural Economics 668). Fall term. Credit two hours. Open only to graduate students with permission. Time to be arranged. Professors Call and Conklin, and Associate Professors Freebairn, Poleman, Sisler, and other staff.

A joint exploration by the departmental staff in international agriculture of current topics in economic development with respect to agriculture. Intended primarily to facilitate the exchange of ideas among staff members, the seminar will be open to a limited number of advanced graduate students. Each student participant will be expected to prepare and defend a paper on a topic associated with his dissertation research.

Seminar on Agriculture and Economic Planning Models (Agricultural Economics 669). Spring term. Credit three hours. Prerequisite: basic macroeconomics and quantitative methods. Lectures, T 1–3. Warren 349. Professor Mellor.

The seminar will deal with planning models as applied to less developed economies and will emphasize the interaction between the agricultural and the nonagricultural sectors. The course will begin with discussion of one sector models of the Harrod-Domar type, proceed to deal with the labor surplus models such as the Lewis, the Fei-Ranis, and the Jorgensen models and then to the multisectoral models of the linear programming type. Finally, it will examine the models in the light of various questions related to planning such as balanced vs. unbalanced growth, choice of techniques, foreign trade, etc.

Sociology and Anthropology

Community and Regional Development and Planned Change (Development Sociology 411). Spring term. Credit three hours. Lectures, T Th 11:15–12:30. Warren 232. Professor Capener and others.

Various strategies of development and planned change will be explored. Reviewed also will be programs, organizations, agencies, and institutions operating in communities and regions that address themselves to various development strategies. Two major emphases are stressed: (1) the structural-functional roles and processes of organizations, agencies, and institutions as they implement programs of change and development in communities and regions, and (2) roles of professionals and change agents representing and making operational development units.

Applications of Sociology to Development Programs (Development Sociology 528). Spring term. Credit four hours. Lectures, M W F 11:15–12:30. Professor Polson.

Application of sociological theory and methods to the problems of institutions and agencies concerned with rural development. Special emphasis is placed on programs for agricultural extension education and community development in low income countries.

Social Anthropology (Anthropology 301). Fall term. Credit four hours. Lectures, M W F 10:10.

A study and comparison of the types of learned, shared, and transmitted behavior patterns and ideas by means of which men of various periods and places have dealt with their environment, worked out their social relations with their fellow men, and defined their place in the cosmos. An inquiry into human nature and its expression in man's institutional and intellectual creations.

Cultural Change: Urban Anthropology (Anthropology 313). Fall term. Credit four hours.

An examination of sociocultural structure and process in urban settings, with emphasis on the role of rural migrants, the relationship of urbanism to political and economic development, the role of voluntary associations, and the adjustment of family and kinship groups to urban life. Emphasis on Asian, African, and Latin American urban centers.

Applied Anthropology (Anthropology 314). Spring term. Credit four hours.

The uses of anthropology in the modern world. Designed not only for students of the humanities and social sciences, but also for natural scientists concerned with the cultural problems involved in technological change, community development, native administration, and modernization in various regions of the world.

Introduction to Social Demography (Sociology 530). Fall term. Credit four hours. Prerequisite: graduate student standing or consent of the instructor. Lectures, M W F 10:10. Assistant Professor Marden.

Demographic Theory (Sociology 531). Fall term. Credit four hours. Lecture, T 1:25–3:20.

Deals with theory construction, hypothesis derivation, and the integration of theory and research in demography. Although emphasis is placed on contemporary theories, earlier formulations beginning with Malthus also are examined insofar as they deal with fertility, mortality, migration, and the people-resource question.

Techniques of Demographic Analysis (Sociology 535). Spring term. Credit four hours. Prerequisite: Sociology 230 or consent of the instructor. Lectures, F 3:35–5:20 and one hour to be arranged.

Social Organization and Change (Sociology 541). Fall term. Credit four hours. Prerequisite: graduate student standing or consent of the instructor. Lectures, T 2:30–3:20, Th 1:25–3:20.

Man in Contemporary Society (Interdepartmental course 350, Human Ecology). Fall and spring terms. Credit four hours. Lecture, M 7–10 p.m. Dean Knapp.

An interdisciplinary approach to problems of man interacting with his physical, biological, and social environments. Analyses of the interaction of the physical, biological, and social dimensions of selected problems of man; implications of these interactions for individuals and families in society.

Perspectives on Poverty (Human Development and Family Studies 372). Fall term. Credit four hours. Lecture, W 2–4:25. Professor Feldman.

Conflicting viewpoints will be presented about the extent, nature, causes, and remedies of economic poverty. Faculty will be drawn from several disciplines both within and outside the College. Various field experiences will be offered, including a short term, live-in exchange, and a continuing project throughout the term.

Research Practicum on the Family in Poverty (Human Development and Family Studies 376). Spring term. Credit three hours. Prerequisite: Human Development and Family Studies 372. Lectures to be arranged. Professor Feldman.

The interview method will be examined as a research tool with particular relevance to low income families. Students will take part in an on-going project by attending staff meetings and by gathering and analyzing data.

Education and Public Health

Designing Continuing Education Programs (Education 524). Fall term. Credit three hours. Lecture, T 1:25–4:00. Professor Leagans.

An analysis of current theories, concepts, principles, and procedures central in the development of programs for the continuing education of adults. Programming is conceptualized as a process of systematic decision making about objectives to be achieved and the design of educative activity to achieve them. In this context, emphasis is placed on such major problems as situation analysis, leadership involvement, need identification, selection of objectives from alternatives, creating support at macro level, organizing program resources at micro level, and planning for program execution.

Educational Communication (Education 525). Spring term. Credit three hours. Lecture, T 1:25–4:00. Professor Leagans.

Emphasizes the centrality of useful technology and effective communication in continuing education programs. Emerging models of the communication process are reviewed as a framework for analyzing major elements, including communicator credibility, program content, messages, organization and use of transmission channels, message treatment, audience identification, feedback, and the design of operation communication programs.

Special Studies in Extension Education (Education 621). Fall term. Credit two hours. Lectures, individual time to be arranged. Professor Leagans and Associate Professor Bruce.

The objective is to provide assistance in thesis preparation to graduate students in extension education. The course consists of three parts: (1) exploration of potential fields and specific delineation of thesis areas; (2) setting up a plan of thesis organization including establishing of objectives or hypotheses, preparation of questionnaires, or other research instruments, collection, analysis, and interpretation of data in line with objectives; and (3) preparation of thesis—its writing, editing, revising, and styling.

Introduction to Hospital and Medical Care Organization (Business and Public Administration 140). Spring term. Credit three hours. Associate Professor Battistella.

Health services are described and analyzed against the backdrop of recent political, social, and economic developments in the United States and Western Europe. For purposes of organization and understanding of forces for change, health services are viewed as a social system—the medical care system—organized along structural-functional lines. Alternative methods of organizing and financing health care services are examined in an effort to evaluate the capacity of the medical care system to respond to pressures generated by changing disease patterns and rising expectations for medical care. The roles and responsibilities of various institutions and professional groups are examined, with particular emphasis on the hospital as the central institution in the provision of community medical care. The process of community planning for health and welfare services is studied, and the relationship of the hospital to that process is analyzed.

Introduction to Clinical Medicine and Public Health (Business and Public Administration 141). Spring term. Credit three hours.

The objective of this course is to familiarize the student with the principal diseases of modern life and to demonstrate how these conditions are controlled in individuals and in communities. Major emphasis is given to those conditions which directly affect the management of hospitals. Consideration is given to the training of physicians, medical and surgical specialists, nurses, and other personnel; the nature of specialized hospital equipment and other facilities for diagnosis and treatment; and the principal procedures used by physicians in diagnosis and treatment in hospitals and in their offices. Major public health problems of various parts of the contemporary world are discussed, and visits are made to nearby hospitals and medical centers at appropriate points in this course.

The Social Psychology of Hospitals (Business and Public Administration 142). Spring term. Credit three hours. Assistant Professor Smith.

The aim of the course is to provide future administrators, planners, and researchers with skill in analyzing the human problems in hospitals, a knowledge of the social-psychological dynamics involved, and the sensitivity to deal with them intelligently. Specific topics include analysis of professionalism, role conflicts within the hospital, the sick role, illness behavior, and the management of institutional change. Some field work experience designed to enrich and reinforce the course content will be included.

Seminar in Health Research (Business and Public Administration 455). Fall term. Credit three hours. Assistant Professor Smith.

The primary objective is to increase the student's ability to evaluate research reports and other studies, to assess their relevance for the field, and to formulate his own problems in a manner conducive to scientific investigation. An examination is made of the contributions of the social sciences and other disciplines to an understanding of current problems in the health field and in hospital administration in particular.

Seminars

Nutrition

Nutrition Seminar (Graduate School of Nutrition 700). Fall and spring terms. Credit one hour. Time to be arranged. Intended primarily for Graduate School of Nutrition students; it is recommended that they attend throughout the year. Professor Barnes and faculty.

Field of Nutrition Seminar (Graduate School of Nutrition 619; also Animal Science 619 and Poultry Science 619). Fall and spring terms. No credit. M 4:30. Fall term, Morrison 348. Spring term, Savage 100.

Lectures on current research in nutrition presented by visitors and faculty.

Seminar in Food and Nutrition (Human Nutrition and Food 605). Fall and spring terms. Credit one hour each semester. T 4:30. Van Rensselaer NG-35. Department faculty.

Biochemistry

Research Seminar in Biochemistry (Biological Sciences 631–632). Fall and spring terms. Credit two hours for two terms. Grades will be given at the end of the spring term. M 8–9:30 p.m. Savage 100. Professor Racker.

Required of all graduate students (except first-year students) majoring in biochemistry. The course may be repeated for credit.

Biochemistry Seminar (Biological Sciences 639). Fall and spring terms. No credit. F 4:15. Stocking Auditorium. Faculty.

Lectures on current research in biochemistry presented by distinguished visitors and staff.

Other Seminars

Food Science Seminar (Food Science 600). Fall and spring terms. Time to be arranged. Stocking 204.

Seminar: International Agricultural Development (International Agriculture 600). Fall and spring terms. No credit. Third and fourth Wednesdays of month, 4:30. Emerson 135. Professor Turk and staff.

Primarily for graduate students interested in an integrated view of problems related to international agricultural development. Undergraduates with a specialization in international agriculture are encouraged to attend without registering. The seminar will focus on developing an understanding of the nature and interrelatedness to agricultural development of the social sciences, plant and animal sciences, foods and nutrition, and natural resources.

Biology and Society (Biological Sciences 201–202). Fall and spring terms. Credit two hours per semester. S/U credit only. M 8:15 p.m. Discussion periods (one hour) to be arranged. Staff and invited speakers.

A series of public lectures dealing with a variety of topics concerning man as an individual, man as a member of society, and man as a member of the community of life on earth. The lectures are open to students and non-student members of the Cornell community as well as to other Ithaca-area residents. The purpose of the discussion period is to permit students to explore lecture material or related topics in depth.

Index to Description of Courses

The courses listed below are arranged numerically under the department or division offering the course.

General Index

CORNELL UNIVERSITY ANNOUNCEMENTS

The Cornell *Announcements* are designed to give prospective students and others information about the University. The prospective student should have a copy of the *Announcement of General Information;* after consulting that, he may wish to write for one or more of the following *Announcements:*

New York State College of Agriculture
College of Architecture, Art, and Planning
College of Arts and Sciences
Department of Asian Studies
Education
College of Engineering
New York State College of Human Ecology
School of Hotel Administration
New York State School of Industrial and Labor Relations
Officer Education (ROTC)
Summer Session

Undergraduate preparation in a recognized college or university is required for admission to certain Cornell divisions, for which the following *Announcements* are available:

Graduate School: Biological Sciences
Graduate School: Humanities
Graduate School: Physical Sciences
Graduate School: Social Sciences
Law School
Veterinary College
Graduate School of Business and Public Administration
Graduate School of Nutrition
Medical College (New York City)
Cornell University–New York Hospital School of Nursing (New York City)
Graduate School of Medical Sciences (New York City)

Requests for the publications listed above may be addressed to
CORNELL UNIVERSITY ANNOUNCEMENTS
Edmund Ezra Day Hall, Ithaca, New York 14850

(The writer should include his zip code.)